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HIGH SCHOOL ENTRANCE EXAMINATION BOARD

DEPARTMENTAL EXAMINATIONS, 1966

GRADE IX

MATHEMATICS

Time — 2 hours.

DO NOT SPEND TOO MUCH TIME ON ANY ONE QUESTION.
READ THE QUESTIONS CAREFULLY.

Total Possible Mark — 177.

Finished work in this booklet may be done in either pencil or ink (blue or black).

For the first 18 questions, five solutions are given for each question, only one of which is correct. You are to circle the NUMBER of the correct answer with a pencil or pen.

From question 23 to the end of the paper partial marks will be given for correct method. For this reason all work should be shown in the space provided for the solution. NO MARKS WILL BE GIVEN FOR WORK IN THE SPACE MARKED "FOR CALCULATION".

When making construction be sure to leave all construction lines in your diagram. DO NOT ERASE THEM. They indicate to the marker just how the construction was done.

DO NOT FOLD THE TEST BOOKLET.

Place your test booklet in the envelope in such a way that the UPPER LEFT HAND CORNER OF THE BOOKLET (Candidate's Number) shows through the SLASHED CORNER of the answer envelope.

(For the use of Sub-Examiners only)

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th.

Values
2 marks
each

SECTION A

With a pencil or pen, circle the LETTER of the correct answer to each of the following 18 questions. An example is:

The product of 7 and 12 is

a. 19 b. 5 c. $\frac{7}{12}$

(d.) 84 e. $\frac{15}{7}$

Since the correct answer is 84, the LETTER d. has been circled.

Circle the LETTER of the correct answer to each of the following questions.

1. The coefficient of x^2 *in* the expression $3mx^2n^2$ is

1. a. $3m$ b. mx^2 c. n^2
d. $3n^2$ e. $3mn^2$

2. $\frac{6x^2y + 3x}{3x} =$

2. a. $2xy$ b. $6xy + x$ c. $6x^2y$
d. $2xy + 1$ e. $2xy + 3x$

3. 10 miles per hour is how many feet per minute?

3. a. 5280 b. 880 c. 52,800
d. 88 e. 31,680

4. 0.25% of $8.00 is

4. a. $2.00 b. 32c c. $80
d. 2c e. 80c

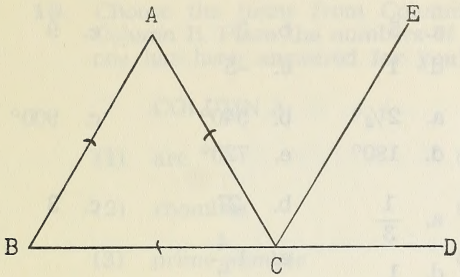
5. Which of the following is an algebraic term?

5. a. $\frac{abc}{2}$ b. $a + b + c$ c. $\frac{a - c}{b}$
d. $a^2b^2 + c$ e. $\frac{a}{b} + \frac{b}{c}$

FOR CALCULATION

(No marks given for work in this space)

6. Triangle ABC is equilateral and CE is a parallel to AB. Which of the statements at the left is true?



6. a. ∠ ABC and ∠ ECD are equal and supplementary.

b. ∠ ACB and ∠ ECD are equal and vertically opposite.

c. ∠ BAC and ∠ ECD are equal and alternate.

d. ∠ ABC and ∠ ACE are supplementary and corresponding.

e. ∠ ABC and ∠ ECD are equal and corresponding.

7. Which of the following numbers is not prime?

7. a. 7 b. 17 c. 37 d. 47 e. 57

8. How many litres are there in one cubic meter?

8. a. 10 b. 100 c. 1,000 d. 250 e. 1,000,000

9. If $\frac{x}{10} = 25$, then $10x =$

9. a. 2.5 b. 2,500 c. $\frac{2}{5}$ d. 250 e. $\frac{2}{25}$

10. $-3(-4)^2 =$

10. a. 24 b. 144 c. –48 d. –144 e. 5.48

11. Which of the following dimensions could not be the sides of a triangle?

11. a. 4″, 5″, 6″
b. 1″, 2″, 2″
c. 1″, 2″, 5″
d. 3″, 4″, 5″
e. 5″, 12″, 13″

FOR CALCULATION

(No marks given for work in this space)

12. The product of 14.6 and 20.9 rounded off to the correct number of significant figures is

12. a. 305.14 b. 30.5 c. 31 d. 3.05 e. 305

13. If $x = 2$ and $y = -1$, then $x^2 - y^2$ is

13. a. 5 b. 3 c. 9 d. 1 e. –5

14. The number of degrees in two and one-half revolutions is

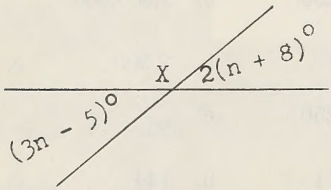
14. a. 2½° b. 540° c. 900° d. 180° e. 720°

15. Simplify:

$$\frac{\frac{4}{5} - \frac{1}{2}}{\frac{1}{2} + \frac{2}{5}} =$$

15. a. $\frac{1}{3}$ b. .27 c. 3 d. 1 e. $1\frac{4}{9}$

16. What is the size of ∠X in this diagram?



16. a. 146° b. 166° c. $155\frac{3}{5}°$ d. 122° e. 142°

17. If cylinder A has radius r and height h, and cylinder B has radius $2r$ and height $\frac{1}{2}h$, the ratio of the volumes of A to B is

17. a. 1 to 4 b. 1 to 2 c. 1 to 1 d. 2 to 1 e. 4 to 1

18. The product of the sum of 6 and 8 and the difference between 6 and 8 is

18. a. –96 b. –28 c. 7 d. 96 e. –24

FOR CALCULATION

(No marks given for work in this space)

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Values

SECTION B

12 **19.** Choose the items from Column A that are most closely associated with the items in Column B. Place the numbers of your choice in the brackets at the right. (The first one has been answered for you).

COLUMN A	COLUMN B	
(1) arc	(a) a triangle with three equal sides	(..... 4 .....)
(2) rhombus	(b) one of the two equal factors of a number	(.....)
(3) prime number	(c) part of the circumference of a circle	(.....)
(4) equilateral triangle	(d) a straight line cutting two other straight lines	(.....)
(5) hypotenuse	(e) a parallelogram with four equal sides	(.....)
(6) diagonal	(f) a straight line joining opposite vertices of a quadrilateral	(.....)
(7) trapezoid	(g) the property possessed by plane figures that are equal in every respect	(.....)
(8) square root	(h) a number divisible only by itself and unity	(.....)
(9) polygon	(i) the longest side of a right triangle	(.....)
(10) binomial	(j) an algebraic expression having two or more terms	(.....)
(11) transversal	(k) a quadrilateral having one pair of opposite sides parallel	(.....)
(12) factor		
(13) congruence		
(14) bisector		
(15) polynomial		
(16) segment		

Values

11 **20.** Determine the answers to these questions. Place your answers on the lines provided.

(a) $(-8) - (-12) =$ .....

(b) $(-3)^2 + (-2)^3 =$ .....

(c) The reciprocal of $2\frac{1}{2}$ is .....

(d) 12.5 is 25% of what number? .....

(e) $\sqrt{\dfrac{4a^2}{9b^2}} =$ .....

(f) $(1.1)^3 =$ .....

(g) A tax rate of $5\frac{1}{4}\%$ is the same as how many mills? .....

(h) $\sqrt[3]{64} \times \sqrt[4]{81} =$ .....

(i) The H.C.F. of 18, 45, and 63 is .....

(j) Change .0875 to a common fraction in its simplest form .....

(k) Find the sum of the prime numbers between 36 and 50 inclusive .....

FOR CALCULATION

(No marks given for work in this space)

Values

7 **21.** Work the following questions in the space provided for calculation. Place your answers in simplest form on the lines provided.

(a) If Tom changed x dimes and y quarters for nickles, how many nickels would he have? .....

(b) $6 + 3 \times 5 - 27 \div 9 + 2 \times 5 =$ .....

(c) The simple interest on $\$b$ at 5% for c years is .....

(d) Express $\frac{5}{11}$ as a recurring decimal .....

(e) $3\frac{4}{5} \div 7\frac{3}{5} =$
(Express answer as a common fraction) .....

(f) The area of a circle whose diameter is $2r$ inches is . . . sq. in. .....

(g) If $-8a^5b^3c^2$ had only two factors and $4a^3b^3c$ were one of them, then the other factor would be .....

FOR CALCULATION

(No marks given for work in this space)

Values

16 **22.** Simplify the following and place your answers on the lines provided.

(a) $3a + 4b - a - 4 + b + 5 =$ .....

(b) $-2(-3) + 4(-1) - (-2) =$ .....

(c) $\dfrac{3ax + 6ay}{3a} =$ .....

(d) $(-1)(-2)(+3)(+2)(-3) =$ .....

(e) $2(3a + 2b) - 3(a - b) =$ .....

(f) $\dfrac{(-4a) + (+5a) + (-6a)}{(3)(5)} =$ .....

(g) $5(2x) + 3(3x) - 4(4x) =$ .....

(h) $\sqrt{a^2 + 2a + 1}$ .....

FOR CALCULATION

(No marks given for work in this space)

Values

23. Perform the indicated operations in the space provided after each problem.

3 (a) Evaluate $2a^3 + 3b^2 + abc$ when $a = -2$, $b = -3$ and $c = -1$.

3 (b) Add:

$$\begin{array}{r} 4x + 3y - z \\ -3x + y + 3z \\ x - 5y - z \\ \hline \end{array}$$

3 (c) Subtract:

$$\begin{array}{r} -3mn + 7m^2n - 5mn^2 \\ -4mn + 7m^2n - 3mn^2 \\ \hline \end{array}$$

Values

3 (d) Multiply:

$$\begin{array}{r} 4a - 3b \\ 2a + 5b \\ \hline \end{array}$$

3 (e) Simplify:

$$\frac{6a^2bc - 9ab^2c + 3abc^2}{-3abc}$$

3 (f) Combine into a single fraction reduced to its lowest terms:

$$\frac{3}{4r} - \frac{2}{5r}$$

FOR CALCULATION

(No marks given for work in this space)

Values

6 **24.** Complete the following statements by writing the correct words in the spaces provided.

(a) The supplement of an obtuse angle is .....

(b) A line drawn from any vertex of a triangle to the midpoint of the opposite side is called a .....

(c) A line joining any two points on a circle is a .....

(d) In a right triangle, one acute angle is the ..... of the other acute angle.

(e) Any plane figure bounded by five straight lines is said to be a .....

(f) If figures are congruent, their areas are equal and their ..... sides and angles are also equal.

FOR CALCULATION

(No marks given for work in this space)

Values

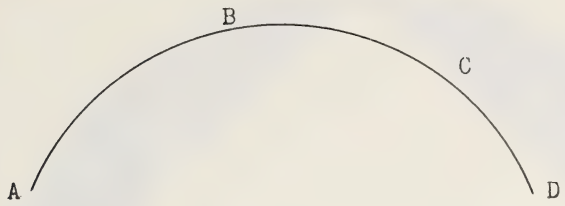
25. Perform the following constructions using ruler and compasses only. Be sure to show all construction lines.

3 (a) The diagonals of a rhombus are $1\frac{1}{2}$ inches and 2 inches respectively. Construct the rhombus.

3 (b) Construct the equilateral triangle ABC whose altitude is CD.

Values

3 (c) Find the center of the circle of which ABCD is an arc. Complete the circle.



Values

3 **26.** (a) Construct and label the triangle ABC with the base BC equal to 8 centimeters, $\angle$ ABC equal to 45° and $\angle$ ACB equal to 60°.

3 (b) Using only compasses and ruler construct a perpendicular from A to the base BC. Measure the altitude of the triangle from Vertex A.

Altitude = ... *cm.*

2 (c) Find the area of the $\triangle$ ABC to the nearest tenth of a square centimeter.

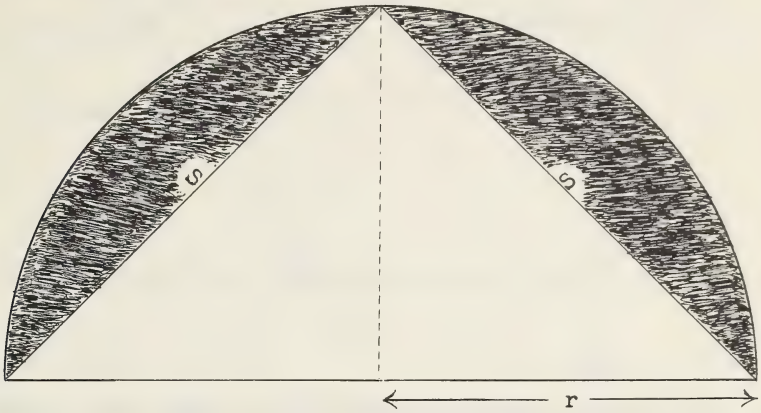
Area $\triangle$ ABC .....

FOR CALCULATION

(No marks given for work in this space)

Values

27. Examine the following diagram carefully. An isosceles triangle is inscribed within a semicircle.



3 (a) Write a formula to represent the area of the shaded portion of the diagram. (Let this area be represented by A)

A = ...

3 (b) Write a suitable formula to represent the boundary of the shaded portion of the diagram. (Let this boundary be represented by B)

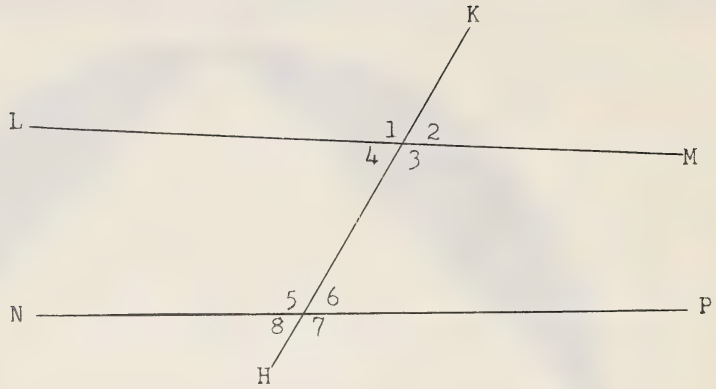
B = ...

FOR CALCULATION

(No marks given for work in this space)

Values

28.



If we assume that lines LM and NP are parallel, and ∠1 equals 110°,

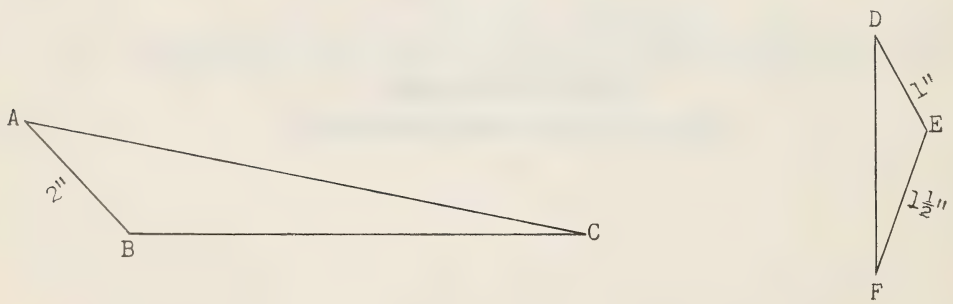
1 (a) How many degrees are in ∠7? .....

1 (b) How many degrees are in ∠6? .....

1 (c) A pair of equal interior alternate angles is ∠ ..... and ∠ .....

1 (d) A pair of equal corresponding angles is ∠ ..... and ∠ .....

3 **29.**



ABC and DEF are similar triangles. Use the information indicated in the diagram to determine the length of BC.

BC = ...

FOR CALCULATION

(No marks given for work in this space)

Values

30. Solve each of the following equations and check your answers. All work must be shown in the spaces provided.

3 (a) $5x + 3 = x + 19$ Check Here.

4 (b) $x(2x - 4) = 2x^2 - 3(x - 5)$ Check Here.

5 (c) $\dfrac{x + 4}{3} = \dfrac{2x - 2}{4}$ Check Here.

FOR CALCULATION

(No marks given for work in this space)

Values

ALGEBRAIC SOLUTIONS ARE REQUIRED FOR THE PROBLEMS ON THIS PAGE.

4 **31.** Find three consecutive odd numbers whose sum is 117.

32. A freight train started from Edmonton on Tuesday at 11:00 p.m. and travelled towards Vancouver at 36 miles per hour. At 12:30 a.m. on Wednesday, a passenger train left Edmonton for Vancouver and travelled 48 miles per hour.

5 (a) At what time did the passenger train overtake the freight train?

1 (b) At what distance from Edmonton did this occur?

FOR CALCULATION

(No marks given for work in this space)

Values

THE STEPS USED IN ARRIVING AT SOLUTIONS TO THE PROBLEMS ON THIS PAGE SHOULD BE SHOWN IN THE SPACES PROVIDED.

5 **33.** A clothing store advertised suits at a discount of 20% off the marked price. A further discount of 10% was allowed if a customer paid cash. What would be the cash price of a suit which was marked at $85.00?

4 **34.** The United Creameries insured their plant against fire damage in three different companies: Company A for $6,000; Company B for $9,000; and Company C for $15,000. The plant was damaged by fire to the extent of $12,000. What payment was made by each of the insurance companies?

FOR CALCULATION

(No marks given for work in this space)

Values

35. Given the formula $C = \frac{1}{4} d^2$

(a) What is the effect on C if

1 (1) d is trebled?

.....

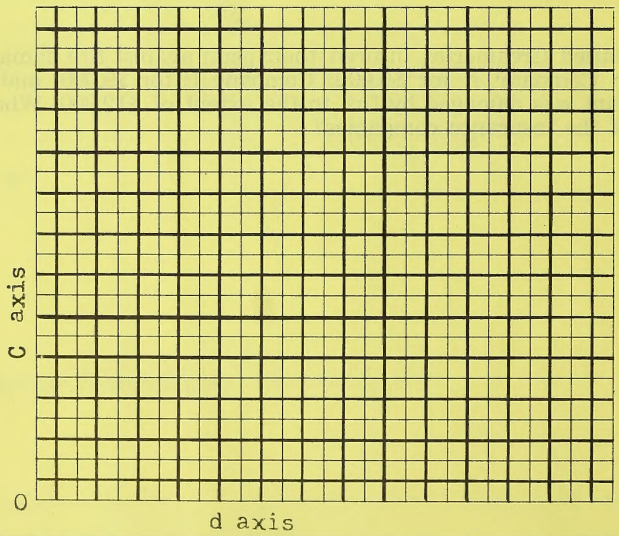
1 (2) d is halved?

.....

2 (b) Fill in the table below with related values of C and d, from the above formula.

d	0	1	2	3				
C					4	9	25	

3 (c) Using suitable scales draw the graph of the formula $C = \frac{1}{4}d^2$ so as to show values of d from 0 through 11.



1 (d) (1) What is the character of the graph?

.....

1 (2) Reading from your graph, what is the approximate value of d when C equals 30?

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